CUSTOMER

DSDC

PARTNERS
in Quality Solutions

INDUSTRY

DSDC
DLA'S Central Design Activity

Software Development

in

Government and Industry

Presented by: DSDC
For more info, send requests to: sepg@dsdc.dla.mil

Description and Objectives

Description: **This course provides an overview of what consumers of software need to know about the approaches that government and commercial industry software development organizations use to produce higher quality software within cost and schedule.**

Objectives:

1. **Identify the state of software development in the U.S. and discuss reasons that software projects succeed or fail**

2. **Review improvement models, including the concepts and terms of the Capability Maturity Model for Software and how it compares to ISO 9000**

3. **Discuss Systems Development from the perspective of each stakeholder role**
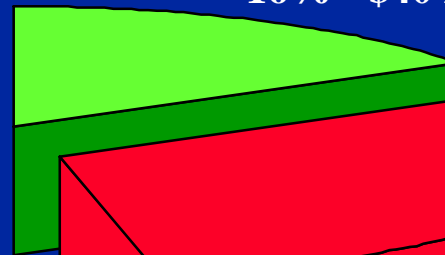
The CHAOS Study

Annual Expenditure for Software Development in the U.S. - $250 Billion

Over Budget, Delayed, Less Than Planned Functionality
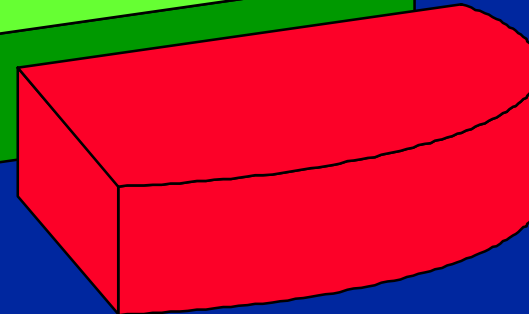**53% - $132.5 Billion**
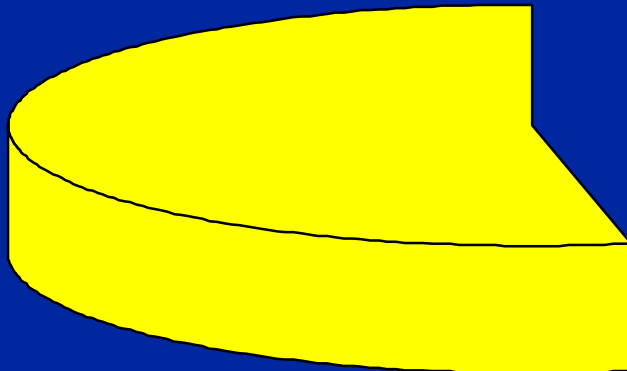
On Budget, On Time, As requested
16% - $40 Billion

Successful

Impaired

Challenged

Canceled In Development
31% - $77.5 Billion

* Conducted By the Standish Group International - Jan 1995

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Software Process Improvement (SPI)
Why Do It?

√ **Most business process improvements implemented via software**

√ **Improved process stability and capability**

√ **Greater predictability for size, cost, schedule, effort & documentation**

√ **Increased quality in products and services**

√ **Reduced rework**

√ **Decreased reliance on testing to ensure quality**

√ **Minimized risk to software development investments**

√ **Efficient project staff start-up time; faster project start-up**

√ **Dynamic allocation of resources**

√ **Improved teamwork among stakeholders**

√ **Improved tool usage**

√ **Long term benefits from continuous SPI**

What is the Return on Investment?

PROJECT/ ARTIFACT	PROJECT/ ARTIFACT SIZE	PHASE	total # defects	actual cost TO FIX	range of projected rework savings BY PHASE		# major defects	range of projected rework savings for MAJOR DEFECTS*	
Project A Rqmts Doc	1091 fp 21820 loc 137 pg SSS	requirements	337	$ 13,814.82			101		
		design			$ 41,444.45	$ 82,888.89		$ 12,421.04	$ 24,842.07
		coding			$ 138,148.15	$ 138,148.15		$ 41,403.45	$ 41,403.45
		unit/sys test			$ 207,222.23	$ 552,592.60		$ 62,105.18	$ 165,613.81
		accept test			$ 414,444.45	$ 967,037.05		$ 124,210.35	$ 289,824.16
		operation			$ 552,592.60	$13,814,815.00		$ 165,613.81	$ 4,140,345.15
Project B Rqmts Doc	321 pg SSS	Requirements	192	$ 29,982.86			10		
		design			$ 89,948.57	$ 179,897.13		$ 4,684.82	$ 9,369.64
		coding			$ 299,828.55	$ 299,828.55		$ 15,616.07	$ 15,616.07
		unit/sys test			$ 449,742.83	$ 1,199,314.20		$ 23,424.11	$ 62,464.28
		accept test			$ 899,485.65	$ 2,098,799.85		$ 46,848.21	$ 109,312.49
		operation			$ 1,199,314.20	$ 29,982,855.00		$ 62,464.28	$ 1,561,607.03
Project C Rqmts Doc	6 pg AWR	Requirements	27	$ 5,606.21			20		
		design			$ 16,818.64	$ 33,637.28		$ 12,458.25	$ 24,916.50
		coding			$ 56,062.13	$ 56,062.13		$ 41,527.50	$ 41,527.50
		unit/sys test			$ 84,093.19	$ 224,248.50		$ 62,291.25	$166,110.00
		accept test			$ 168,186.38	$ 392,434.88		$124,582.50	$ 290,692.50
		operation			$ 224,248.50	$ 5,606,212.50		$ 166,110.00	$4,152750.00

* Based on formulas reported in Barry W. Boehm's book,
Software Engineering Economics (Englewood Cliffs,N.J.: Prentice Hall, 1981).
*

Who Benefits?

END USERS

√ **Higher quality products**

√ **Faster**

√ **Desired functionality**

CUSTOMERS (SPONSORS)

√ **All above plus**

√ **Lower Total Cost**

√ **Lower Risk Projects**

DSDC

√ **All above plus**

√ **Stable, challenging work environment**

DLA

√ **All above plus**

√ **Organization that survives AND thrives now AND in the future**

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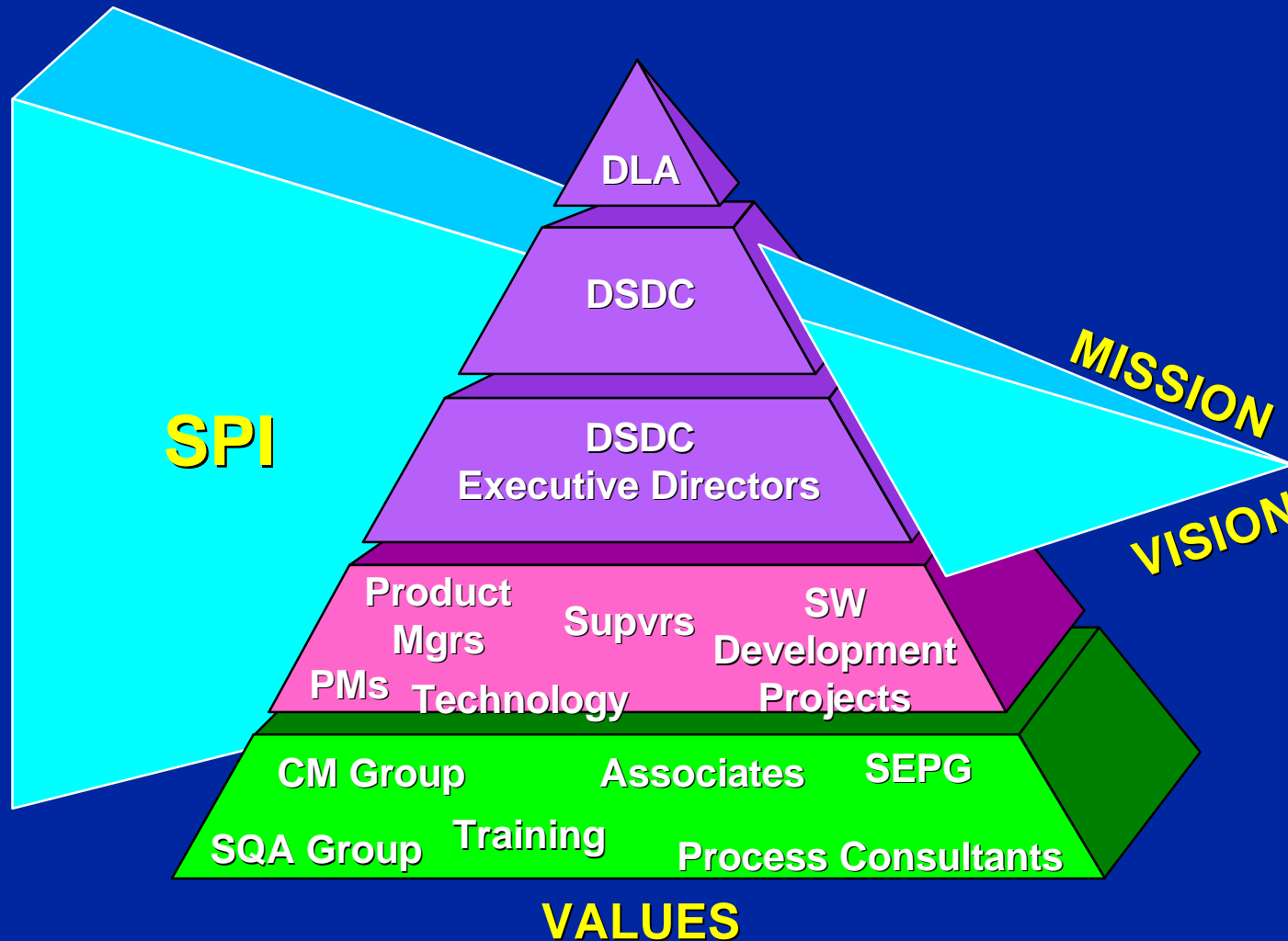
The Operational Framework

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INDUSTRY

POLICIES

STANDARDS

Constraints on Process

PROCESSES

Process Implemented By

METHODS & PROCEDURES

Methods & Procedures Supported By

TRAINING

TOOLS

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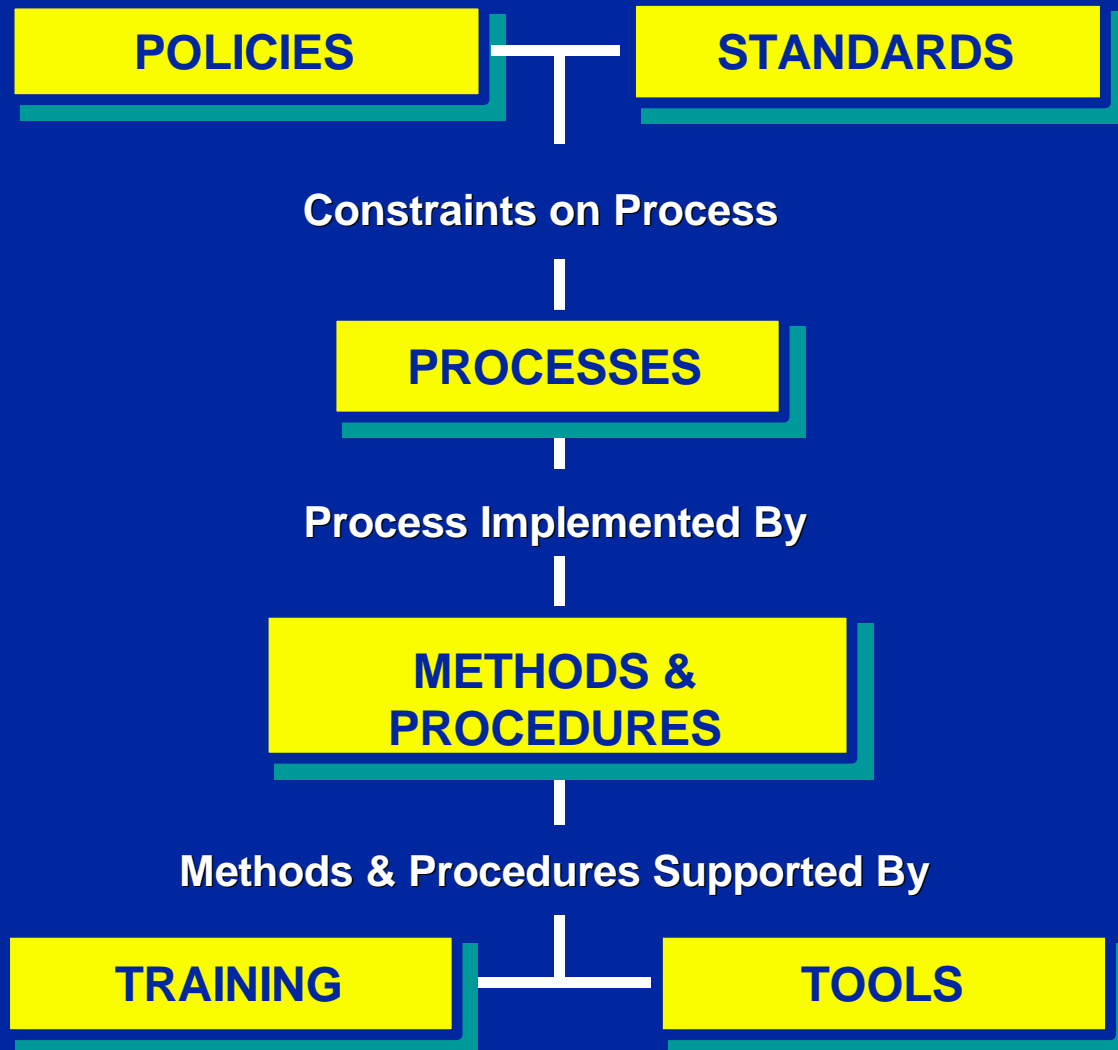
The Capability Maturity Model (CMM) for Software

LEVEL	KEY PROCESS AREAS	RESULT
OPTIMIZING 5	DEFECT PREVENTION TECHNOLOGY INNOVATION PROCESS CHG MGT	**PRODUCTIVITY AND QUALITY**
MANAGED 4	PROCESS MEASUREMENT AND ANALYSIS QUALITY MANAGEMENT	
DEFINED 3	ORGANIZATION PROCESS FOCUS ORGANIZATION PROCESS DEFINITION PEER REVIEWS TRAINING PROGRAM INTERGROUP COORDINATION SOFTWARE PRODUCT ENGINEERING INTEGRATED SOFTWARE MGT	
REPEATABLE 2	REQUIREMENTS MGT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MGT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION MGT	
INITIAL 1		**RISK**

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Other Improvement Models

√ **ISO 9000**

√ **ISO SPICE**

√ **Malcolm Baldridge**

√ **Other CMMs**

√ **The Microsoft Framework (MSF)**

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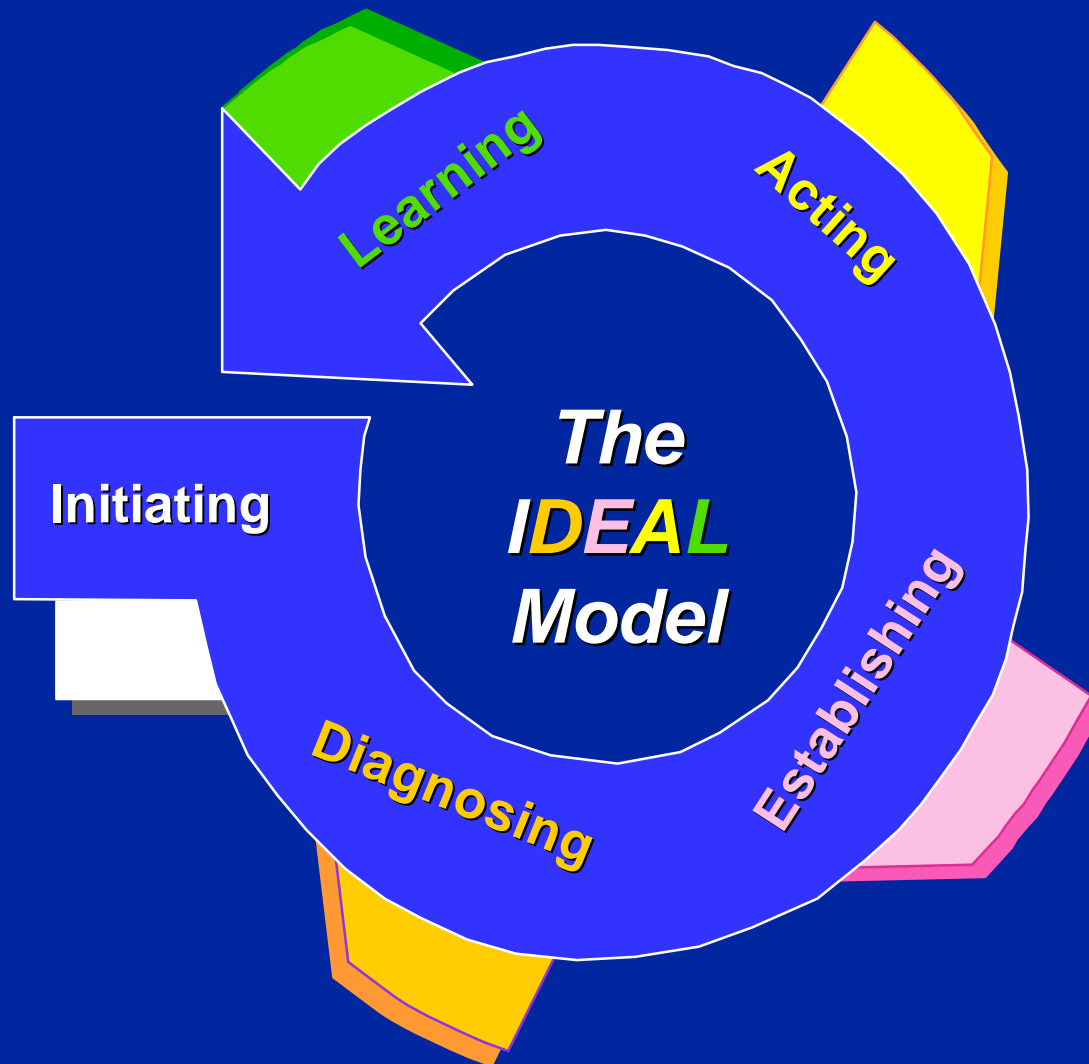The Improvement Life Cycle

Implementing Improvements

One-on-One Assistance

- SEPG
- Process Consultants
- Training Consultants

Overviews

- CMM
- CMM Appraisals
- DSDC Status
- MIL-STD 498
- Project Mgt
- Risk Mgt
- Configuration Mgt
- SQA
- Size/Cost Estimation
- Testing
- Software Environments

Mentor

Educate

Entry Point

Develop Skills

Train

Hands-on Workshops

- Requirements Definition
- Formal Inspections/ Peer Reviews
- Function Pts/COCOMO

Detailed Courses

- Requirements Definition
- Formal Inspections/ Peer Reviews
- Function Pts/COCOMO

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Assessing the Results

Strengths

√ **Strong Senior Management Commitment to Process Improvement**

√ **SEPG is operating effectively**

√ **Associates not afraid of hard work**

√ **Organization has strong technical capabilities**

√ **Organization is eager to improve**

√ **Organization committed to delivering quality products**

√ **Organization knows and supports its systems and customers**

√ **Organization understands that everyone (including customers) must take this journey together**

√ **DSDC Project Guide is a very effective tool**

√ **Auditing has enhanced implementation of the process**

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Recurring Themes

√ **Resources are adequate for current workload but can easily become strained with downsizing and increased number of projects**

√ **Metrics are being collected but not used effectively to improve the process**

√ **Metrics have not been defined for all level 3 KPAs and therefore there is limited management visibility**

√ **Policies and procedures have not been fully defined for most level 3 KPAs**

√ **Level 3 Institutionalization Common Features are not satisfied for most KPAs**

Recommendations

√ **Review metrics program and how the metrics can be used more effectively to improve process and products**

√ **Review resource allocations based on changes in the organization and workloads**

√ **Address life cycle requirements traceability**

√ **Establish an organizational planning database**

√ **Establish defect and lessons learned database**

√ **Improve definition of technical interfaces with subcontractors**

√ **Acquire automated tool for configuration management**

√ **Expand SQA audits to cover technical software products**

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